Editorial

Electrochemistry and Your Automobile

DOLLARS TO DOUGHNUTS, the average driver seldom thinks of electrochemistry in relation to the 100 horsepower, four-wheel conveyance whose whereabouts he commands. If he does, he probably thinks of a storage battery, ignition, lights, horn, and the substantial energy supplied by electrochemical reaction to start the engine. Electrochemistry, however, also enters beyond the obvious, and in a manner not calculated by the automobile designer.

Each time an engine is started, minute galvanic cells begin operation within the cylinders. Electrochemical action, stimulated by condensation of combustion products, dissolves iron of piston rings and cylinder walls in small amounts, interpreted as "wear," but which actually is corrosion superimposed on the damage by fragments of metal torn off the metal surface mechanically according to the more conventional picture of wear. About 60 per cent of so-called engine wear is really chemical attack, related in mechanism to rusting of water pipes or tarnish of copper.

Corrosion of engines is a major economic loss to this country which claims forty million or so of automobiles alone, exclusive of other types of internal combustion engines. Over $1,000,000,000 might be saved annually on overhaul of engines were cylinder corrosion eliminated.

Factors that account in major part for corrosive attack of engines are sulfuric and other sulfur-containing acids forming from organic sulfur of gasoline; hydrobromic acid formed by decomposition of lead tetraethyl mixtures added to fuels as antiknock; and, to a lesser extent, organic and carbonic acids from combustion products. Were pure hydrocarbons used as fuel, corrosive "wear" of engines presumably would be much less. This is the basis in part for the recent decision of a bus transit company in Ohio to use liquified propane in place of

Continued on next page

commercial gasoline, thereby reducing by a factor of one-half the regular overhaul of their engines. This advantage is in line with results of laboratory test engines which showed that use of hydrogen as fuel caused less corrosive wear of piston rings than did conventional fuels.

Corrosion of this kind can be diminished by addition of suitable corrosion inhibitors to oil or gasoline, but these are not yet available in most commercial products. Also, some gain can be made by use of corrosion resistant piston rings and cylinder liners, an approach which has already come to the attention of truck engine designers. Finally, it is possible to neutralize acids in the engine oil, or, as a last resort, to drain and discard the oil periodically, as is presently recommended for all cars and trucks. The Society of Automotive Engineers, for example, recently reported that the automobile owner truly saves considerable wear of an engine by replacing oil every 1,000 miles. In so doing, it is stated, he pays an average of $5.16 more per year for oil than were he to change every 2,500 miles, but he saves an estimated $25.00 per year on engine ring jobs. What the Association might have added was that one of the reasons for this economy is diminished corrosive attack of the engine.

Report of the Chlor-Alkali Committee of the Industrial Electrolytic Division for the Year 1949*

Axel Heilborn

Since R. B. MacMullin's very complete report of a year ago[1], a few noteworthy developments have taken place.

Production

The U. S. chlorine production for several months during 1949 dropped to about 90 per cent of the December 1948 value but recovered toward the end of the year and reached an all-time high in December with an estimated figure of 166,812 short tons, or almost 5400 tons per day. The yearly total has been given as 1,765,117 tons—an increase of approximately 9 per cent over 1948 in spite of the slump from February until June. "Chlorine is the only heavy chemical that did not slip back last year."[2]

Present installed capacity is estimated to 5500 tons of chlorine gas per day, excluding the Denver Arsenal and other smaller plants standing idle. Most electrolytic chlorine cells are nowadays efficiently operated at capacities and current densities considerably above those for which the cells were originally designed.

R. L. Murray, in his Schoellkopf medal address before the Western New York Section of the American Chemical Society, May 17, 1949, gives a very complete and excellent summary of the present status of the chlorine industry.[3] This paper shows graphically the growth of the industry for the past 57 years and lists all present operating plants in U. S. (about 55) and Canada (9). It is estimated that the installed chlorine capacity of U. S. and Canada amounts to 58 per cent of that of the entire world. (The table is broken down into 18 countries, including "all others.")

Murray also reviews past and present commercial types of chlorine cells of all kinds and concludes that the chlorine in the U. S. by the end of 1949 comes from:

Diaphragm cells	84%
Mercury cells	7%
Fused salt cells (excluding $MgCl_2$)	8%
Nitric acid process	1%

Six chlorine producers make caustic potash as part of their alkali production. The caustic potash production is quite small compared with that of caustic soda.

Uses

The reader is again referred to the article by Murray in which a breakdown into a large number of individual uses and products was made on the basis of the 1948 production. The largest single outlet is for pulp and paper, taking about 15 per cent of the production. Sanitation is listed as 3.6 per cent of the total; for treatment of sewage and other wastes, chlorine is becoming increasingly important.

The very rapid growth of the chlorine consumption during the past 10 to 15 years has been due to a number of chemical processes requiring large amounts of chlorine, such as production of ethylene glycol, carbon tetrachloride, monochlorobenzene, trichlorethylene, vinyl chloride, tetraethyl lead, ethylene dichloride, bromine, magnesium, and synthetic glycerine, to mention only the 10 largest uses in order of magnitude, as listed by Murray.

Shipping Chlorine

Less than half of the chlorine manufactured is shipped in containers to other users. About a year ago The Chlorine Institute, Inc., reported the following number of shipping containers for liquid chlorine:

Cylinders	165,000 (est.)
Ton containers	18,000 (est.)
Multi-unit underframe cars	297
16-ton single unit tank cars	432
30-ton single unit tank cars	1,004
55-ton single unit tank cars	310
Barges at 380 tons per barge	2
Barges at 600 tons per barge	8

These figures have undoubtedly grown some during the last 12 months.

The safety record in shipping liquid chlorine is very good. (Nearly all chlorine accidents occur when handling chlorine at consumer plants.) This indicates that I.C.C. regulations and specifications are good. The Chlorine Institute, Inc., has for the past 25 years taken an active part in promoting safety and in standardization of valves, etc., in the interest of safety in transit. A tank car safety valve for handling corrosive gases is an interesting and successful development of this kind.

Storage tanks for liquid chlorine, holding 50 to 100 tons, are getting more common on manufacturers' premises. Installations for sending liquid chlorine through pipe lines have been reported, in one case a distance of two miles.

Caustic Soda

The total caustic soda production dropped some in 1949 (as did the soda ash production). With electrolytic soda up, caustic soda from soda ash and lime dropped noticeably, and the electrolytic soda now accounts for around three-fourths of the total caustic soda.

Production facilities for making

* Report read at the meeting of the Industrial Electrolytic Division, held on Thursday, April 20th, at the Cleveland Meeting of the Society.

[1] *J. Electrochem. Soc.*, **96**, 21*C* (July 1949).

[2] *Chem. Eng.* (February 1950).

[3] *Ind. Eng. Chem.*, pp. 2155-2164 (October 1949).

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rayon-grade caustic from diaphragm caustic (by nearly complete removal of chloride, chlorate, and iron) are increasing yearly, inasmuch as mercury cell grade soda in the United States is quite limited. For large tonnages the liquid ammonia extraction process is preferred because of its efficiency and simple operation, in spite of its large installation cost. The removed chloride and chlorate appears in the final "still bottoms," amounting to about 5 per cent of the soda production.

With railroad freight rates continuously increasing, the trend toward shipping 73 per cent caustic soda in tank cars, instead of the 50 per cent liquid grade, is logical.

Equipment is now on the market for the continuous evaporation of caustic soda to anhydrous product in a "high concentrator" design developed by The Dow Chemical Company and using Dowtherm as the heating medium. The flow sheet for the Diamond Alkali Company's new large Houston plant shows a concentrating step of similar type. The successful avoidance of nickel contamination in this step depends upon complete removal of chlorate in the feed liquor, and at least one such process is now commercially available. At least for new and large alkali plants, the elimination of the old inefficient cast-iron caustic pots is now found to be justified.

A new, promising use for caustic soda for descaling of metals has been announced during 1949 by the Hooker Electrochemical Company.

Hydrogen Chloride

In some instances (Hooker, Diamond) HCl is obtained by combustion of chlorine with hydrogen for the use in organic syntheses, particularly in combination with acetylene. Diamond Alkali Company's process for concentrating and purifying of gaseous HCl by water absorption, stripping, and drying by cooling to a 99.5+ per cent gas is described in the October 1949 issue of *Industrial and Engineering Chemistry* (pp. 2165–2167). A similar process on a smaller scale at Bay Chemical Company is shown in the November 1949 issue of *Chemical Engineering* (pp. 110–111).

The possible outlet of by-product hydrogen chloride as a chlorinating agent, or for the manufacture of chlorine, continues to be an important subject of investigations.

U. S. patent 2,468,766 presents a new version of the much studied problem of economically oxidizing muriatic acid for large-scale production of chlorine. In this process a polyvalent metallic chloride, such as cupric chloride, is electrolyzed in cells at only 0.72 volts to chlorine and—in this example—

(*Continued on page 134C*)

Der Internationale Scientist

II. Der Volta und seine Peils*

Sol Neman

Die Studenten in der Universitaet zu Pavia waren Holitaerrers,—die Strietlemps haven sie am Halloween gebostet, und die Garbetschkenns gedommpt—und sieben Mal in einer Nacht haben sie dem Prof. Alessandro Volta den Dorrnacker geklappert. Da hat der gute Doktor doch endlich ein Fiuss gebloht. "Nun ist doch mein Limit gerietscht" fuhmt er, "elende Lohfers, euch will ich fixen!"

Und so denkt er nun, wenn andere[1] mit blos zwei Metallstuecke Froschschenkel twitschen machen konnten, was wuerde er nicht selbst mit e'Koppel hundert Metallpaare akkomplischen! Also nimmt er e'silber Bock, und e'Zinkwascher, und e' Stueck Blattingpapier das er erst in Salzwasser gedunkt hat, und noch e' Bock,[2] und wieder e' Zink, und so an, bis er ein Peil von eibettju ennihau 300 Volts hat. Dann hitscht er ein Ende des Peils mit e' Weier an den Dorrnacker, und graundet das andere Ende, und ohboi! der naechste

Poles, positive and negative.

Bursche, der den Nacker retteln will, wird selbst fuer e' Lup genackt.

Der Volta reportet[3] sein Socksess an die Royal Society in London, und bald haben die Scientists in allen Laendern auch Peils,—noch viel groesser wie Voltas—und fangen an, Leute zu schocken, und zu elektroleisen, und sogar zu plehten, wie niemand sein Bissness. In Poland gab es zwei Professore, die hatten e' Brehnsturm‡ und haben die Weiers von der Batterie getehstet. Dann wurde e' grosse Feit gestetscht! Der erste insistet, es schmecke sauer, der zweite meint nein, mehr wie Seife; der erste sagt, "Mein Meind ist aufgemacht, es ist doch so"; der andere sagt "Balloni!"; und so kommt es, dass noch heute an jeder Batterie e' positiver Pol und e' negativer Pol ist.

Volta wurde fuer seine Arbeit von Napoleon geonnert, und seine Stadt hat ihn Praesident fuer Leif von der Pavianerhalloweenneusundhellrehsungsverhinderungsgesellschaft gemacht. Zwar haben die Buben nie wieder mit seinem Dorrnacker gemonnkieht, doch schon am naechsten Halloween haben sie sein Beckhaus getippt und einen sehr toten Skonk durch sein Fenster gehieft. Und so haben ihm seine Peils am Ende doch viel Trubel gemacht.

* Honi soit qui mal y pense.—Ed.

[1] Swammerdam, 1678; Galvani, ca 1786.

[2] " . . . . douzaines de petites plaques ou disques . . . d'argent, d'un pouce de diamétre, plus ou moins, [par exemple, de monnoyes (*sic*)] . . . ."—A. Volta, *Phil. Trans. Roy. Soc.*, **90**, 405 (1800).

[3] *Loc. cit.*

‡ What the U. S. Supreme Court defined as "flash of genius."—Ed.

Cleveland Convention—Outstanding Success

The Ninety-Seventh Meeting of the Society, held in Cleveland, Ohio, April 19, 20, 21, and 22, 1950, with headquarters at the Statler Hotel, was one of the most successful in the Society's history. More than 600 members and guests, by far the largest attendance at a national meeting, were present to take advantage of the comprehensive program of 90 technical papers and to enjoy a full schedule, including entertainment, plant trips, and ladies' program, planned by the Cleveland Local Committee.

CHARLES L. FAUST
Newly-elected President

ROBERT J. MCKAY
Newly-elected Vice-President

Technical Program

The technical program offered sessions sponsored by the following Divisions: Electric Insulation, Electronics, Electrothermic, Industrial Electrolytic, and Theoretical Electrochemistry.

The Electric Insulation Division offered six papers on "New Techniques in Electrical Insulation Research" and "Paper Makers' Contributions to Electrochemical Arts." Mr. Thomas D. Callinan of the Naval Research Laboratory, Washington, D. C., presided.

The Electronics Division sponsored a total of seven sessions on Rare Metals, Instrumentation, and Luminescence. The session on Rare Metals opened with an address by Dr. B. S. Hopkins of the University of Illinois entitled "The Less Important Metals and the Future." Nineteen papers covering latest developments in the study of titanium, zirconium, palladium, gallium, germanium, selenium, thallium, vanadium, and beryllium were presented under the chairmanships of Dr. Bruce W. Gonser of Battelle Memorial Institute, Dr. John R. Musgrave of The Eagle-Picher Company, and Dr. Donald M. Wroughton of the Westinghouse Electric Corporation. Seven papers were presented at the session on Instrumentation, under the chairmanship of Professor E. A. Arnold of Case Institute of Technology. Supplementing the Symposium on Luminescence, under the able leadership of Dr. H. C. Froelich, were a keynote address by Professor Roland Ward of the University of Connecticut, "An Ideal Phosphor," and a well-attended round table which offered those attending an opportunity for an informal discussion of the technical papers presented.

Dr. Julian Glasser of Armour Research Foundation was responsible for planning the outstanding program offered by the Electrothermic Division. A total of 27 papers were scheduled for the following sessions: "Borides, Nitrides, and Phase Studies," with Dr. J. T. Norton of Massachusetts Institute of Technology presiding; "High-Temperature Operations," under the chair-

RECEIVING LINE AT THURSDAY EVENING RECEPTION: LEFT TO RIGHT: SECRETARY-EMERITUS COLIN G. FINK, PRESIDENT-ELECT CHARLES L. FAUST, MRS. FAUST, MRS. FERGUSON, MRS. SCHAEFER, PRESIDENT FERGUSON, AND CHAIRMAN OF THE CLEVELAND SECTION RALPH SCHAEFER

manship of Dr. Glasser; "New Highly Refractory Carbides," with Mr. Marvin Udy, Chromium Mining & Smelting Company as Chairman; "New Highly Refractory Oxides," with Mr. A. E. Pavlish, Kelley Island Line & Transport Company presiding; and "Cermets and Metal Ceramic Systems," under the chairmanship of Dr. I. E. Campbell of Battelle Memorial Institute. A well-attended round table on the "New Highly Refractory Materials" completed this excellent program.

A successful symposium on "Instrumentation in the Chlor-Alkali Industry" included a program of eight papers presented at two sessions. Dr. R. B. MacMullin of Niagara Falls, New York, Chairman of the Division, presided at these sessions.

An unusually large attendance attested to the success of the annual Symposium on Theoretical Electrochemistry. Professor William von Fischer of the Case Institute of Technology led the discussions at the two sessions, which included ten papers.

Annual Business Meeting

The annual business meeting of the Society was held following luncheon on Thursday, April 20th, in the Euclid Ballroom. The interest of the members in the business affairs of the Society was indicated by the unusually large attendance. Business included reading of the annual reports of the Secretary and the Board of Directors (to be published in the July issue of the JOURNAL), and announcement of the results of the recent election in which Dr. Charles L. Faust of Battelle Memorial Institute was elected President of the Society, and Dr. Robert J. McKay of International Nickel Company, Inc. was elected Vice-President.

Dr. Faust has held many offices in the Society, the last being senior Vice-President. He is Supervisor of the Electrochemical Engineering Division at Battelle Memorial Institute, Columbus, Ohio.

Dr. McKay, whose term as Vice-President runs for three years, is Chemical Engineer in charge of Plating Sales and Development, International Nickel Company, Inc., New York.

Other officers of the Society are: Ralph Hunter, senior Vice-President; J. C. Warner, Vice-President; E. Gideon Widell, Treasurer; and Henry B. Linford, Secretary.

Dr. Faust, in making his plans for the coming year, has made the following committee appointments:

Membership Qualifications Committee—Louis Weisberg, Chairman, H. Bandes, and L. I. Gilbertson.

Committee for the Advancement of the Science and Profession of Electrochemistry—A. L. Ferguson, Chairman, R. M. Hunter, J. C. Warner, R. J. McKay, and C. L. Faust.

Finance Committee—E. G. Widell, Chairman, H. B. Linford, F. L. LaQue, J. C. Warner, and R. M. Burns.

Membership Committee—L. I. Gilbertson, Chairman; R. Scott Mojeska, Chicago; R. B. Hoxeng, Cleveland; Orlan M. Arnold, Detroit; F. W. Koerker, Midland; Myron Corey, Niagara Falls; E. L. Eckfelt, Philadelphia; G. H. Kissin, San Francisco; Paul Howard, Washington-Baltimore; Erwin Schumacher, Battery; F. L. LaQue, Corrosion; J. F. Gall, Electric Insulation; R. Woofter, Electrodeposition; D. H. Wamsley, Electronics; I. E. Campbell, Electrothermic; F. E. Herstein, Industrial Electrolytic; J. A. Lee, at large; and T. L. Grant, St. Louis.

Publication Committee—H. H. Uhlig, Editor; Norman Hackerman, Technical Editor; F. L. LaQue, Business Manager.

Ways and Means Committee—J. C. Warner, Chairman, R. M. Hunter, C. A Crowley, W. C. Moore, R. M. Burns, and H. J. Read.

Annual Banquet

A reception for President and Mrs. Ferguson was held Thursday evening at 6:00 P. M. in the Pine Room. The annual banquet followed at 7:30 P.M. in the Euclid Ballroom. Mr. William G. Harvey, former President of the Society, acted as toastmaster. The presidential address was delivered by President A. L. Ferguson. Dr. Ferguson's subject, "What the Society Would See if It Looked In a Mirror," was unusually interesting to all who attended. Dr. Ferguson, by quoting from letters received from former presidents of the Society, gave those present a comprehensive and authoritative view of the past, present, and future of the Society.

Another feature of the banquet was the annual awards of the Young Author's Prize and the Turner Book Prize.

AT THE THURSDAY EVENING RECEPTION: MRS. SANBORN; CHARLES B. SANBORN, CHAIRMAN OF THE FINANCE COMMITTEE; MRS. FROELICH; N. M. WINSLOW, CHAIRMAN OF THE HOTEL COMMITTEE; MRS. WINSLOW; AND H. C. FROELICH, SECRETARY OF THE CLEVELAND SECTION

MEMBERS AND GUESTS ENJOY THE ANNUAL BANQUET, HELD ON THURSDAY EVENING

The Young Author's Prize of $100 was awarded to Mr. J. C. Griess, Jr., of the Oak Ridge National Laboratory, Oak Ridge, Tennessee. Mr. Griess was co-author with L. B. Rogers, D. P. Krause, and D. B. Ehrlinger of the paper, "The Electrodeposition Behavior of Traces of Silver," published in the February 1949 issue of the JOURNAL and co-author with L. B. Rogers of the

JOHN C. GRIESS, JR.
Winner of Young Author's Prize

paper, "Electroseparation of Traces of Silver from Palladium," appearing in the March 1949 issue of the JOURNAL.

Mr. Griess received his Bachelor of Science degree from Indiana University in 1943. After two years in the Army's Special Engineer Detachment in Oak Ridge, he returned to Indiana University, receiving a Master of Arts degree in Chemistry in 1947. His thesis work at this time was on the electrodeposition of lead and was carried out under the direction of Professor Frank C. Mathers. Since April 1947, Mr. Griess has been employed as a chemist at the Oak Ridge National Laboratory. His primary interest has been the electrodeposition of trace quantities of various elements, particularly at controlled cathode potentials.

The Book Prize to Young Authors, consisting of $50 worth of scientific and technical books published by the Reinhold Publishing Corporation, was awarded to Mr. Ralph F. Hoeckelman. Mr. Hoeckelman was co-author with I. E. Campbell, V. D. Barth, and B. W. Gonser of the article, "Salt-Bath Chromizing," published in the October 1949 issue of the JOURNAL.

Mr. Hoeckelman graduated from the University of Illinois in 1947 with a Bachelor of Science degree in Chemical Engineering. He is now employed at Battelle Memorial Institute, Columbus, Ohio, and is continuing his education at Ohio State University. His major interest is in high temperature metals.

Friday Luncheon and Dinner

On Friday, April 21st, luncheons were sponsored by the following Divisions: Electronics, Electrothermic, Electric

RALPH F. HOECKELMAN
Winner of Turner Book Prize

Insulation, Industrial Electrolytic, and Theoretical Electrochemistry. Elections of officers and other business carried out at these luncheons will be found under "Division News" on page 128 C of this issue.

Following a cocktail hour Friday night, a dinner was held in the Statler Ballroom at 7:15 P.M. Entertainment arranged by the Local Committee, including feats of magic and mind reading by Stuart Cramer, "Magical Mirthmaker," and music for dancing, made this function one of the highlights of the meeting.

Plant Trips

Many members and guests attending the convention took advantage of the interesting plant trips arranged by the Local Committee. Wednesday night, a trip was enjoyed to the General Electric Company Lighting Center at Nela Park. On Thursday and Friday afternoons, large groups took advantage of the opportunity to visit the B. F. Goodrich Research Center and the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics.

Ladies' Program

Ladies who were at the meeting enjoyed the exceptional program arranged by Mrs. C. C. Rose and her committee. On Thursday, a tour was made of the west side of Cleveland and its suburbs, followed by luncheon in the Seaglade room of the Lake Shore Hotel. Friday was equally entertaining with a bus trip to the east side of Cleveland, visits to the Museum of Art and Historical Museum, and a complimentary luncheon at the Acacia Country Club.

At the suggestion of Mr. R. C. Hienton, donations were obtained from leading concerns in the Cleveland area, making possible the extensive and entertaining program for the ladies at a minimum of cost. The organizations contributing to this fund for the ladies' entertainment were: Harshaw Chemical Company, The B. F. Goodrich Company, McGean Chemical Company, General Electric Company, Diamond Alkali Company, National Carbide Company, Ohio Crankshaft Company,

PRESIDENT AND MRS. FERGUSON AT CLEVELAND CONVENTION

Brush Beryllium Company, Union Carbide & Carbon Corporation, National Distillers Products Corporation, and Cleveland Electric Illuminating Company.

* * *

Credit for the outstanding success of this meeting belongs to the many members who contributed much time and effort in planning an attractive program. In addition to those who arranged the extensive technical program, sincere appreciation is still being expressed to the members of the Cleveland Local Committee: George W. Heise, Honorary Chairman; Leon R. Westbrook, General Chairman; Clarence C. Rose, Vice-Chairman; N. M. Winslow, Hotel Committee Chairman, N. C. Cahoon, J. W. Gartland, J. Prescott; Leo Pucher, Registration Committee Chairman, F. C. Keller, J. M. Margolis, L. C. Werking; H. R. Schoenfeldt, Program Committee Chairman, J. O. Aicher, W. O. Graff, R. S. Mackie; C. E. Heil, Entertainment Committee Chairman, P. S. Brooks, R. O. Hull, W. Irwin, J. Prescott; C. B. Sanborn, Finance Committee Chairman, H. P. Coats, H. C. Lee, H. B. Osborn, Jr.; R. C. Hienton, Plant Trips Committee Chairman, D. A. Aitken, A. E. Pavlish; K. S. Willson, Publicity Committee Chairman, M. M. Beckwith, A. H. DuRose, L. N. Elicker, P. R. Pine, H. R. Friedberg; Mrs. C. C. Rose, Ladies Committee Chairman, Mrs. C. E. Heil, Mrs. R. C. Hienton, Mrs. G. W. Heise, Mrs. C. B. Sanborn, Mrs. R. A. Schaefer, Mrs. L. R. Westbrook, and Mrs. K. S. Willson.

Society Lectureship and Student Prizes Established

The Board of Directors, at the recent Cleveland meeting, approved a proposal to establish an honorary lecture and medal in the field of corrosion or fundamental electrochemistry. These are to be presented at the time of the annual corrosion symposium. In this same proposal plans were included for establishing prizes for the best papers submitted by a graduate student and an undergraduate student. Financial support for the lectureship and prizes will come from royalties received from sale of the "Corrosion Handbook," published in 1948 by John Wiley & Sons, Inc., and sponsored by the Society. Royalties have now accumulated to a total of over $11,000 made possible by the "Handbook" authors who contributed without remuneration.

Members of the Committee appointed to administer the "Corrosion Handbook" fund and who proposed the lectureship and prizes are Dr. J. C. Warner, representing the Board of Directors; Dr. R. M. Burns, representing the "Corrosion Handbook" Editorial Advisory Board; Dr. I. A. Denison, Chairman of the Corrosion Division; and Dr. H. H. Uhlig, Editor of the "Corrosion Handbook."

India Section Holds Inaugural Meeting

The Inaugural Meeting of the India Section of the Society, the first to be formed outside of the United States, was held on the 23rd and 24th of March at the Indian Institute of Science, Bangalore. Well attended by scientists, engineers, industrialists, and others, the meeting gave evidence of the keen interest by all in the future of electrochemistry in India.

The first day's program started with a business meeting of the Section. A resolution thanking the Board of Directors of the Society for their encouragement and help in forming the Section was passed. The members next approved the recommendation of the Executive Committee that the present officers continue for 1950–51, as the Section had not yet started active work and, following this, they discussed the future program for the Section.

At the Inauguration, Mr. J. Balachandra, Vice-Chairman, welcomed those present. Dr. T. L. Rama Char, Secretary, presented the report explaining the activities of the Society, the importance of electrochemical research, teaching, and industry in India, and the circumstances leading to the formation of the India Section of the Society with headquarters at Bangalore. He finally appealed to scientists and engineers, industrialists, universities and research institutions, and government bodies for their cooperation and help in building the Section and promoting the development of electrochemistry. Messages of good wishes received from the Board of Directors, scientific institutions, industrialists, scientists and engineers, and others were then read.

Dr. B. K. Ram Prasad, Electric Grid Department, Government of Bombay, and Chairman of the Section, delivered the Inaugural Address on "Some Aspects of the Development of Electrochemical Industries in India." He indicated that there were great possibilities for the development of electrochemical industries keeping in view the availability of raw materials, present output of electric power, and future power development plans. The speaker was glad that the Government of India had decided to establish a central Electrochemical Research Institute at Karaikudi and expressed the hope that the Planning Commission recently set up by the Government would consider in detail the development of electrochemical industries in India. Mr. S. G. Sastry, Industrial Chemist, briefly referred to the development of the industry with special reference to Mysore State. Dr. Gilbert J. Fowler, Chairman, Bangalore Section of the Royal Institute of Chemistry, expressed great pleasure on the formation of the India Section and wished it every success. A vote of thanks was proposed by Mr. V. Aravamuthan, Chairman of the Program Committee.

The technical session was held on the next day, March 24th. Mr. V. Aravamuthan, Research Assistant in the Department of Metallurgy, Indian Institute of Science, Bangalore, read a paper on "The Utilization of Offpeak Electricity in Combination with Lignite for the Production of Steel in South India." In this paper, the author indicated the indirect way of employing lignite and offpeak electricity as a substitute for metallurgical coke through the production of hydrogen in the manufacture of steel. The advantages and the economy of the process over (*a*) the electric furnace method using coke or charcoal and (*b*) the fuel-fired blast furnace method were pointed out. After a lively discussion, the session came to a close.

T. L. Rama Char, *Secretary-Treasurer*

Division Editors

At the April 19th meeting of the Board of Directors, held at the Cleveland Meeting, it was recommended that, in the future, the Divisional Representatives on the Review Committee of the Journal be called Division Editors. This recommendation was accepted, and the change is now in effect.

Firm Name Changed

The Kaiser Aluminum and Chemical Corporation is the new name given recently to the firm formerly known as the Permanente Metals Corporation of Oakland, California. The company operates two divisions, chemical and aluminum.

Divisions Plan Future Programs

Corrosion

Plans are now being made for the meeting of the Corrosion Division at the Buffalo Convention, October 12–15, 1950. In view of the great interest in the measurement and interpretation of electrode potentials and other electrical properties of metals in relation to corrosion processes, one session of the meeting is to be devoted to papers on this topic. The Division invites those who may have interesting work under way in this field to submit papers for the program. Papers of general interest in the field of corrosion are also invited since additional sessions are planned to the extent that time is available. Titles and abstracts of papers should be submitted to the Division Chairman, and inquiries may be addressed to any of the Division officers. Complete manuscripts should be submitted, in triplicate, to the Editor of the JOURNAL, 235 West 102nd Street, New York 25, N. Y.

For the current year the officers of the Division are:

Chairman—I. A. Denison, National Bureau of Standards, Washington 25, D. C.

Vice-Chairman—J. M. Pearson, Sun Physical Laboratory, Bishop Hollow Road, Newtown Square, Pennsylvania

Secretary-Treasurer—Norman Hackerman, Department of Chemistry, University of Texas, Austin, Texas

Electric Insulation

The two symposia sponsored by the Electric Insulation Division at the recent meeting in Cleveland were so successful that plans were announced immediately for sponsoring two more sessions at the Spring Meeting of the Society, to be held in Washington, D. C., April 8–11, 1951. This seemed particularly appropriate because of the long and well-known interest of the Bureau of Standards in dielectric work.

One symposium, under the chairmanship of Mr. P. L. Staats, General Electric Company, Pittsfield, Massachusetts, will include papers on "Electrolytic Condensers" and the materials which go into their fabrication. A second session, under the chairmanship of Dr. John J. Chapman, Johns Hopkins Research Institute, will deal with "Dielectric Problems of Wire and Cable Manufacture." Should the response be sufficiently great, a third on "Liquid Dielectrics" will also be held.

THOMAS D. CALLINAN, *Secretary-Treasurer*

Electrodeposition

The Electrodeposition Division is planning three concurrent symposia to cover before, during, and after plating. The first, on "Preplating" is to be held during the Fall Meeting in Buffalo, October 11–14, 1950. A very interesting program has already been formulated with sessions devoted to "Cleaning Various Basis Materials" and "Evaluation of Cleaning Procedures."

Papers are now being solicited for the second symposium planned for the fall of 1951 on "Theoretical Phases of the Plating Bath and of Metal and Alloy Deposits." It is requested that all those who are preparing or contemplate preparing papers on these subjects please contact this JOURNAL or R. A. Woofter, Vice-Chairman, The Electrodeposition Division, c/o Jones & Laughlin Steel Corporation, 40 Longworth Street, Pittsburgh 7, Pa.

A third symposium, to be held in the fall of 1952, will be devoted to "Post Plating Treatments" and "Deposit Evaluation Procedures."

R. A. WOOFTER, *Vice-Chairman*

Electrothermics

Since the 1950 Fall Meeting of The Electrochemical Society will be held in the Buffalo-Niagara Falls area, the Electrothermic Division feels that this would be an opportune time to hold a round-table discussion on electric furnace operation.

The Electrothermic Division normally holds its symposia at the spring meetings, and this practice will continue. Because the Niagara Falls area is the center of electric furnace operation, the Division will sponsor a meeting not normally scheduled.

Mr. George J. Easter, Electro Refractories and Alloys Corporation, Buffalo, 20, New York, will be moderator of the round-table discussion. The Division feels fortunate in securing Mr. Easter for this role, inasmuch as he has had diverse experience in electric furnace operation as Director of Research of Carborundum Company, and now as Technical Director of Electro Refractories and Alloys Corporation.

A panel of experts prominent in the field will be present at the meeting. The meeting, however, will be informal and off the record, and all those interested in the subject matter are invited to attend and participate in the discussions.

For the above meeting, please contact Mr. George J. Easter and submit your suggestions as to specific subject matter to be covered.

JULIAN GLASSER, *Chairman*

The 98th Meeting of The Electrochemical Society

will be held at the

Statler Hotel, Buffalo, New York

October 11, 12, 13, and 14, 1950

Sessions on

Batteries, Corrosion, Electrodeposition, Organic Electrochemistry

Round table on Electrothermics

Bell Labs Announce Phototransistor

Bell Telephone Laboratories recently announced the Phototransistor, a semiconductor photoelectric device, which can be employed in many applications now using conventional vacuum-type photoelectric cells. Its major advantages are small size, ruggedness, low impedance, and high output power compared to conventional photocells.

The Phototransistor, like its parent device, the amplifying Transistor, uses a very small disk of germanium, a semi-conducting material. A tiny wire is pressed against the bottom of a dimple ground into one face of the disk, which is only three thousandths of an inch thick at this point. The amount of light focused onto the opposite, undimpled, side of the disk controls the flow of current between the germanium and the wire. The device gives good response to a rapidly fluctuating light source and is especially sensitive to the wave lengths of light emitted by ordinary incandescent lamps.

The Phototransistor was invented by Dr. John N. Shive of the Laboratories staff in the course of development work on Transistor-like devices. Although it is still in the experimental stage, it is expected that the new photocell will have far-reaching significance in electronics and electrical communication.

MEETINGS OF OTHER ORGANIZATIONS

American Electroplaters' Society, 37th annual convention, Hotel Statler, Boston, Massachusetts, June 12–15

American Institute of Electrical Engineers, summer general meeting, Pasadena, California, June 12–16

American Society of Heating & Ventilating Engineers, semi-annual meeting, Muskoka Lakes, Ontario, Canada, June 19–21

American Society of Mechanical engineers, semi-annual meeting, Hotel Statler, St. Louis, Missouri, June 19–23

Fifth National Instrument Conference and Exhibit, Memorial Auditorium, Buffalo, New York, September 18–22

38th National Safety Congress and Exposition of the National Safety Council, Chicago, Illinois, October 16–20

DIVISION NEWS

Additional news of Division activities appears on page 127C.

Battery Division

The Executive Committee of the Battery Division met during the Cleveland Convention. The results of balloting on the proposed revision of the by-laws were announced. The division members adopted the revision by a vote of 127 to 2. The by-laws were approved by the Board of Directors of the Society and now provide for two-year terms for the officers and other members of the Executive Committee.

A nominating committee has been appointed consisting of Dr. George W. Vinal, National Bureau of Standards, Chairman; Mr. R. W. Erwin, National Carbon Company; and Mr. L. E. Lighton, Electric Storage Battery Company. They will propose nominees for two-year terms to begin October 1950.

Plans for two symposia on batteries at the forthcoming Buffalo Meeting are progressing and promise at least two full sessions. The regular business meeting will also be held at that time.

U. B. Thomas, *Secretary-Treasurer*

Electrothermic Division

The annual business meeting of the Electrothermic Division was held Thursday, April 20, 1950, at the Hotel Statler in Cleveland at 1:15 P.M. following a Division luncheon.

The meeting was called to order by Julian W. Glasser, Chairman of the Division. After brief introductory remarks by Dr. Glasser, the annual report of the Secretary-Treasurer was presented by I. E. Campbell. The net worth of the Division was reported as $3,228.88 as of April 15, 1950.

The report of the committee for nomination of officers for 1950–51 was read by Dr. Glasser, since none of the committee was to be present. The committee, consisting of C. P. Zergiebel, Chairman, J. D. Sullivan, and O. D. Crosby, made the following nominations: J. W. Glasser, Chairman; C. H. Chappel, Vice-Chairman; I. E. Campbell, Secretary-Treasurer. Following the reading of nominations, a resolution was adopted authorizing the Secretary to cast a unanimous ballot for the nominees, all of whom were incumbents.

Following the election of officers, Dr. Glasser stated the necessity of revision of the by-laws of the Division to conform to the by-laws of the Society and to those of other Divisions, and a committee consisting of C. H. Chappel, Chairman, A. T. Hinckley, and M. H. Udy was appointed to consider and make recommendations for the revision.

The principal topic of discussion at the meeting was the undertaking of the compilation of a monograph on the "New Highly-Refractory Materials." The need for such a monograph was stressed by a number of the members present, and it was generally agreed that the possibility of undertaking the project should be given further consideration by the publication committee.

I. E. Campbell, *Secretary-Treasurer*

Electronics Division

Following a Division luncheon, held on Friday, April 21, 1950, at the Cleveland Convention, the Electronics Division held its annual business meeting. At this time, several items of importance to members of the Division were discussed.

New by-laws of the Division, which had been revised by a committee headed by Dr. J. W. Marden, were read. Members had been sent copies of the new by-laws before the meeting. It was suggested that the name of the Fluorescent Group be changed to the Luminescent Group. A motion to this effect was made, seconded, and passed. A further motion to accept the by-laws as written (with the foregoing exception) was duly seconded and unanimously passed. The new by-laws took effect at once.

Reports from the various group chairmen were presented, covering the work of each group for the past year. Condensed versions of these reports are presented below. It is obvious that the Electronics Division has had a most successful year and the ambitious plans for the new year are expected to be fulfilled.

The Division approved the idea of having keynote speakers at the annual symposia and also made tentative plans for an annual review of the entire electronics field to be published in the first 1951 issue of the Journal.

The report of the Secretary-Treasurer was read and approved.

The report of the Nominating Committee for officers for the ensuing year was presented by Dr. Marden, chairman of this committee. Following a request for nominations from the floor, the election of new officers was held and the following unanimously elected:

General Chairman—Erwin Lowry, Syl-

vania Electric Products, Inc., Salem, Massachusetts.

Vice-Chairman for Luminescent Group—Herman Froelich, General Electric Company, Nela Park, Cleveland, Ohio

Vice-Chairman for Rare Metals Group—Bruce Gonser, Battelle Memorial Institute, Columbus, Ohio

Vice-Chairman for General Electronics Group—D. H. Wamsley, R.C.A. Manufacturing Company, Lancaster, Pennsylvania

Secretary-Treasurer for Electronics Division—John R. Musgrave, Eagle-Picher Company, Joplin, Missouri.

Following the election of officers, Dr. H. R. Schoenfeldt, retiring Chairman, expressed his appreciation to the officers and members of the Division for the fine work which has been done during the past year and the hope that the Division could continue to grow and maintain its important position.

Dr. Lowry, the incoming General Chairman, made the following appointments: *Nominating Committee*—J. W. Marden, Chairman, A. L. Smith, and R. H. Cherry. He also appointed the following past Chairmen to the *Executive Committee*—H. R. Schoenfeldt, E. G. Widell, and J. W. Marden.

Dr. Marden, as head of the Nominating Committee, requested suggestions for candidates, pointing out that it was impossible for the Nominating Committee to have personal knowledge of the activities and capabilities of all members of the Division, and that the Committee wished to prepare a slate which would be most satisfactory to all concerned.

Rare Metals Group—During the past year this Group arranged a technical program for the 1950 Spring Meeting of the Society at Cleveland. A keynote address was presented by Dr. B. S. Hopkins of the University of Illinois, and there were 19 technical papers arranged in three sessions.

Plans for another Rare Metals Symposium, to be held at the 1951 Spring Meeting in Washington, are under way, including the possibility of presenting a display of rare metals.

During the past year, several reviews have been written for the JOURNAL on various rare metals, and it is hoped that the practice will continue.

Luminescent Group—This Group presented a symposium under the direction of Dr. H. C. Froelich, comprising a keynote speech by Dr. Roland Ward and 11 papers on various phases of luminescence. An informal round-table discussion on luminescence by Dr. Gorton Fonda appeared in the January 1950 JOURNAL. Plans for expanding the activities of the Luminescent Group are in process.

General Electronics Group—Under the Chairmanship of Dr. Eric Arnold and Mr. R. H. Cherry, a symposium on Instrumentation was held at Cleveland. In addition, a joint session with the Industrial Electrolytic Division was held on "Instrumentation in the Chlor-Alkali Industry."

A symposium on "Gaseous Discharge" is being considered for the Washington meeting. The plan is for at least a half-day discussion.

JOHN R. MUSGRAVE, *Secretary-Treasurer*

Industrial Electrolytic Division

The following officers were elected at the annual meeting of the Industrial Electrolytic Division, held at the Cleveland Convention, April 21, 1950:

Chairman—A. C. Loonam, 70 East 45 Street, New York City

Vice-Chairman—F. Woodman, Southern Alkali Corporation, Maplewood, Louisiana

Secretary-Treasurer—Kenneth B. McCain, Wilbur B. Driver Company, Newark, New Jersey

Theoretical Electrochemistry Division

At the recent Cleveland Convention the Theoretical Electrochemistry Division elected the following new officers:

Chairman—H. H. Uhlig, Massachusetts Institute of Technology, Cambridge, Massachusetts

Vice-Chairman—William von Fischer, Case Institute of Technology, Cleveland, Ohio

Secretary-Treasurer—W. L. Haden, Pittsburgh Plate Glass Company, Barberton, Ohio

SECTION NEWS

Chicago Section

Dr. John R. Musgrave, of the Eagle-Picher Company, Joplin, Missouri, presented a very informative picture on the "Production of Cadmium, Germanium, and Indium," to the Chicago Section on April 7 at the Chicago Engineers' Club. The film shown in conjunction with the meeting took the audience through the mines, concentration, and smelting of the ores, to the final preparation of zinc, cadmium, and germanium.

The Tri-State ore field, located at the junction of Missouri, Kansas, and Oklahoma, is one of the largest mining fields in the United States. In addition to being one of the largest sources of zinc, it is also a source of cadmium, germanium, indium, and gallium. From this field is derived practically all of the germanium which is being commercially produced in the United States.

While zinc, indium, and cadmium are rather well known and their uses have been described, germanium and gallium are relatively new in the commercial field. Germanium has attained considerable importance in electronics work and there is a possibility of commercial uses for gallium, but these are mostly in the development stage at the present time.

Emphasis was placed on the uses of germanium, the primary one being based on its properties as a semi-conductor. It has proven extremely valuable in many electronics applications, showing ability to replace some types of vacuum tubes and its use is increasing rapidly.

J. H. CONOLLY, *Secretary*

Washington-Baltimore Section

The Washington-Baltimore Section met at the Bureau of Standards on April 26th. Mr. O. C. Ralston, Chief Metallurgist of the U. S. Bureau of Mines, gave an excellent discussion on the subject "Electrostatic Separation of Mixtures of Solid Particles." Mr. Ralston has been with the Bureau of Mines since 1912 except for a period of 10 years in private industry, and is the author of numerous books and papers in the field of metallurgy.

The electrostatic separation of dry solids started about 1902. The peculiar property of each type of material determines whether it will be a conductor or an insulator. It is this property plus the ability of the material to pick up a charge which makes electrostatic separation possible. For example, a particle may pick up either a positive or negative charge by conduction, induction or frictional means while others will tend to remain neutral. Essentially this is directly related to the dielectric constant of the particular material. The dielectric constant is the specific induction capacity of the material.

The conditioning of the surface of

the particles has proved extremely important in the extension of the use of the electrostatic method of separation. By certain chemical treatment the surface is prepared to remain as an insulator or become a conductor. The use of corona discharges have proved quite effective in inducing charges on particles which could not be charged otherwise.

There are several procedures used for such a separation of materials. However, they are analogous to a condenser with one plate charged positively and the other plate, wire or point, charged negatively. It is necessary to have all materials dry, otherwise there will be leakages which cause trouble. Present work indicates that 10 to 20 watts of power would treat 2–4 tons of material in 24 hours. Over-all costs range from approximately 10 cents per ton on large quantity operation to 80 cents per ton on small quantity operation.

A business meeting followed the address in which the following officers were re-elected to serve for the next year:

Paul L. Howard, *Chairman*
Dr. Abner Brenner, *Vice-Chairman*
Dr. J. C. White, *Secretary-Treasurer*

Reports of the various committees indicated that plans for the national meeting to be held here April 8–12, 1951 were progressing satisfactorily.

A plant trip has been scheduled for May to visit the Crown Cork and Seal Company, in Baltimore followed by a dinner and social evening with the Baltimore members of the Section.

PAUL L. HOWARD, *Chairman*

PERSONALS

A. J. HUMPHREY has been engaged in development work in electronics by the Reliance Electric and Engineering Company, Cleveland, Ohio. His previous connection was with the Carbide & Carbon Chemical Corporation, Concord, Tennessee.

THOMAS P. MCFARLANE has accepted a position with American Hardware Corporation, New Britain, Connecticut, in the capacity of Process Engineer for all metal finishing operations. Previously Mr. McFarlane was with the National Lead Company of Brooklyn, New York.

LEONARD W. WRAY has recently accepted a position as chemist with Bomac Electrotype Company Ltd., Toronto, Ontario, Canada.

JOHN R. SMYTH has been transferred to the home office of the Electric Storage Battery Company, Philadelphia, where he is employed as research engineer. Formerly Mr. Smyth was supervisor of the experimental laboratory at Willard Storage Battery Company, Cleveland.

CHUK-CHING MA, who has been research engineer at Westinghouse Electric Corporation and later associate professor of industrial chemistry at Loyola University, is now located in New Orleans, Louisiana, as an Associate Professor of Chemical Engineering with Tulane University. He is to be responsible for the expanding of the graduate program of the School of Chemical Engineering there.

RALPH M. HUNTER, Manager of the Electrochemical Division of The Dow Chemical Company and a director of Dow Chemical of Canada, Limited, recently received the honorary degree of Doctor of Engineering from the Case Institute of Technology. Dr. Hunter is senior Vice-President of the Society.

NEW MEMBERS

At the meeting of the Executive Committee held on April 5, 1950, at the office of The Electrochemical Society, Inc. 235 West 102nd Street, New York City, the following were elected to membership:

Active Members

G. M. BUTLER, The Carborundum Company, Buffalo Avenue, Niagara Falls, New York (Electrothermic)

HAROLD J. DE WANE, National Bureau of Standards, Rm. 11, East, Washington 25, D. C. (Battery)

GEORGE B. DIAMOND, Dept. of Chem. Eng., Pratt Institute, Brooklyn 5, New York (Electro-Organic)

KEITH HENDERSON, General Electric Company, mailing add: 1864 Alvason Road, East Cleveland 12, Ohio (Electronics)

LESLIE E. LANCY, Consulting Engineer, mailing add: Country Club Drive, Ellwood City, Pennsylvania (Electrodeposition)

BETTY M. LUCE, Cleveland Graphite Bronze Co., mailing add: 1051 E. 146th Street, Cleveland 10, Ohio, (Electrodeposition)

RICHARD F. MARKEL, Great Lakes Carbon Corp., P. O. Box 637, Niagara Falls, New York (Electrothermic)

FRANCIS X. MCGARVEY, Rohm & Haas Co., mailing add: 107 7th Avenue, Haddon Heights, New Jersey (Industrial Electrolytic)

EARNEST E. NELSON, Naval Research Laboratory, mailing add: 311 U Street, N. E., Washington 2, D. C. (Battery)

RICHARD F. PAGEL, Cerro de Pasco Copper Corp., mailing add: Hotel Junin, La Oroya, Peru, S. A. (Theoretical Electrochemistry, Corrosion, Electrodeposition, Electrothermics and Electronics)

WILLIAM B. ROBERTS, Sylvania Electric Products, 35–22 Linden Place, Flushing, L. I., New York (Electronics)

WILBUR H. ROSE, Winchester Repeating Arms Co., P. O. Drawer 906, New Haven 4, Conn. (Battery)

ARTHUR C. SECREST, JR., Battelle Memorial Institute. 505 King Ave., Columbus, Ohio (Electronics and Electrothermic)

ZALMAN M. SHAPIRO, Westinghouse Atomic Power Division, Box 1468, Pittsburgh, Pennsylvania (Electrothermic)

M. VIRGINIA SINK, Chrysler Corp., mailing add: 9940 Sashaban Rd., R #1, Clarkston, Michigan (Corrosion and Theoretical Electrochemistry)

CLYDE R. TIPTON, JR., University of California, Box 1663, Los Alamos, New Mexico (Corrosion, Theoretical Electrochemistry and Electrodeposition)

DAN TRIVICH, Wayne University, mailing add: 16204 Northlawn, Detroit 21, Michigan (Electrodeposition and Theoretical Electrochemisty)

WILLIAM VON FISCHER, Case Institute of Technology, Cleveland 6, Ohio (Corrosion)

GUY W. WORK, Naval Research Laboratory, mailing add: 5028 12th St. N.E., Washington 17, D. C. (Battery)

Reinstatement

ARTHUR L. PITMAN, Naval Research Laboratory, Code 3260, Washington 25, D. C. (Battery)

Associate Members

SAMUEL T. BENTON, Carbide & Carbon Chemical Division, mailing add: 115 Princeton Avenue, Oak Ridge, Tennessee (Battery and Electrodeposition)

DOROTHY E. EVANS, General Electric Company, mailing add: 17220 Euclid Avenue, Cleveland 12, Ohio (Electronics)

CHARLES C. FRANCIS, The Thomas Steel Company, mailing add: 780 Kenilworth Ave., S. E., Warren, Ohio (Electrodeposition)

DANIEL MARMER, Electro-Chemical Engraving Co., Inc., mailing add: 516 East 2nd Street, Brooklyn 18, New York (Electrodeposition and Theoretical Electrochemistry)

EMORY B. MICHEL, The Thomas Steel Company, mailing add: 210 High Street, Warren, Ohio (Electrodeposition)

FREDERICK H. PERFECT, The Beryllium Corp., mailing add: 111 W. 33rd St., Reiffton, Pennsylvania (Electrothermic)

JOSEPH G. SEVICK, St. Joseph Lead Co., Monaca 7, Pennsylvania (Electrothermic)

ANNOUNCEMENTS FROM PUBLISHERS

THE ANALYTICAL CHEMISTRY OF INDUSTRIAL POISONS, HAZARDS, AND SOLVENTS, 2nd edition, by Morris B. Jacobs. Published by Interscience Publishers, New York, 1949. 806 pages, $12.00.

This book presents to the reader the record of progress that has been made in the field of industrial hygiene insofar as it applies to analytical chemistry, since the publication of the 1st edition eight years ago. This has entailed changes in most chapters, adding 127 pages to the book. The field of analytical chemistry of industrial poisons is covered exhaustively. Ample references to periodical literature, monographs, etc.

PHYSICAL METHODS IN CHEMICAL ANALYSIS, Volume I, Edited by Walter G. Berl. Published by Academic Press Inc., New York, 1950. 664 pages, $12.00.

This work describes those physical methods that have either proved themselves of considerable value in quantitative analytical work or are destined to play an important role in the future. The reader will find a discussion of the various "Unit Operations," the techniques, and instruments that can be used by the analyst in the identification, both qualitative and quantitative, of atomic, molecular and ionic species, crystal phases and arrangements, surface structures and area, etc. Enough experimental and theoretical data have been assembled to minimize the need of consulting more specialized texts or the original literature, in the sense of enabling the reader to become familiar with the underlying principles of the methods and to analyze the applicability of the techniques to his specific problems.

RECENT NBS PUBLICATIONS

Copies of the following publications of the National Bureau of Standards may be obtained at listed prices from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Some Physical Properties of Porcelains in the Systems Magnesia-Beryllia-Zirconia and Magnesia-Beryllia-Thoria and their Phase Relations, S. M. Lang, L. H. Maxwell, and R. F. Geller, 19 pp., 15 cents (RP2034).

This paper provides data on some properties of high-strength high-temperature ceramics, such as high thermal-shock resistance and conductivity, resistance to oxidation and errosion, and ability to maintain dimensions at high temperatures.

Directional Effects in Dielectric Properties of Molded Rubber, Arnold H. Scott, 10 pp., 10 cents (RP2030).

For purposes of this test, slabs of rubber-filler mixtures were prepared so that flow in sheeting and molding was greatly accentuated in one direction. This paper describes the method of molding and gives values of dielectric constant and dissipation factor for measurements made on a variety of mixtures.

"Standard Grade" Hot-Dipped Galvanized Ware (Coated after Fabrication), 11 pp., 5 cents (CS161-49).

The purpose of this commercial standard is to establish minimum essential requirements for material, workmanship, and construction of the articles of hot-dipped galvanized ware. Requirements are covered for base metal and coating.

Dissociation Constants of Weak Bases from Electromotive-Force Measurements of Solutions of Partially Hydrolyzed Salts, Roger G. Bates and Gladys D. Pinching, 8 pp., 5 cents (RP2043).

A method for the study of weak bases when the ordinary methods are difficult to use.

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VOLTAMOSCOPE
(an indicating instrument)
AND VOLTAMOGRAPH
(a recording instrument)
for Polarographic Analysis

The **VOLTAMOSCOPE** is a non-recording instrument wherein the voltage and current are read and manually plotted. Many chemical determinations are simply made by reading the currents of two known voltages and finding the difference.

The **VOLTAMOGRAPH** consists of a robust pen writing galvanometer with amplifier and a potentiometer with chart driving mechanism. Suitable for industrial and research purposes. The voltage-current graph is automatically drawn. Operates directly from A.C. line. Identical electrodes are used for both indicating and recording models. *Write for bulletin B 255.*

CAMBRIDGE INSTRUMENT CO., INC.
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PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

RECENT PATENTS

Selected for electrochemists by Fred. W. Dodson, Chairman of the Patent Committee, from the Official Gazette.

January 31, 1950

Jennings, P. A., 2,495,731, Stainless Steel Resistant to Leaded Fuels at High Temperatures

Krasnow, S., and Curtiss, L. F., 2,495,736, Radiant Energy Activation

Strickland, H. A., Jr., 2,495,787, Induction Furnace Push-Out Rod

Marburg, E., 2,495,854, Low Alloy Steel Containing Titanium

Mondolfo, L. F., 2,495,941, Electroplating Copper on Aluminum

O'Hearn, F. T., 2,496,065, Electric Discharge Lamp

Jennings, P. A., 2,496,245, Internal-Combustion Engine Valve; 2,496,246, High-Temperature Article; 2,496,247, High-Temperature Article; 2,496,248 Internal-Combustion Engine Valve

February 7, 1950

Mansfield, S. A., and Bishop, C. E., 2,496,299, Finishing Process for Spinning Jets

Blackburn, W. E., 2,496,432, Selenium Rectifier

Matthias, L. H., and Ragatz, E. C., 2,496,555, Contact for Electrical Switches

Soller, W., and Kraus, G., 2,496,564, Low Melting Point Silver Solder

Blackburn, W. E., 2,496,692, Selenium Rectifier

Hein, C. C., 2,496,721, Rectifier

Buck, R. S., 2,496,774, Thermoelectric Gas Probe

Moffatt, E. M., 2,496,806, Gas Temperature Probe of the Thermocouple Type; 2,496,807, Gas Probe of the Thermocouple Type

Ward, L. A., 2,496,835, Gas Temperature Probe of the Thermocouple Type

Schneider, G., 2,496,961, Process for the Production of Spinning Jets

Griffith, D. L., and Isherwood, E. I., 2,496,996, Electrolytic Recovery of Zinc

Billman, J. H., 2,497,024, Electrochemical Preparation of α-Amino-n-Butyric Acid and N-Benzoyl Derivative

Simpson, N. H., and Cutter, P. R., 2,497,036, Coating Magnesium and Magnesium Base Alloys

Brasch, A., Re. 23,195, Method of Sterilizing and Preserving

February 14, 1950

Lincoln, R. A., Application 608,872, Cold Rolled Stainless Steel Having Substantially Uniform Mechanical Properties and Method of Making Same

Miller, H. D., and Williams, P. D., 2,497,090, Electrode and Method of Making the Same

Williams, P. D., 2,497,110, Method of Making Electrodes; 2,497,111, Electron Tube Having Carburized Thoriated Cathode

Schulman, J. H., 2,497,140, Method of Manufacture of Luminescent Materials

Herber, P., and Richardson, W. C., 2,497,169, Gas Distributing System

Downing, J. R. O., 2,497,213, Pressure Gauge

Perley, G. A., 2,497,235, pH-Responsive Glass Electrodes

Rutherford, H. E., 2,497,238, Battery Terminal

Gocskens, H., Elenbaas, W., and Padmos, A. A., 2,497,496, Electrode Structure for Electric Discharge Devices or Lamps

Dubpernell, G., 2,497,591, Method of Minimizing "Patchiness" in Etched Chronium Electrodeposits

Amsden, R. D., 2,497,649, Process of Electroforming Selenium Rectifiers

Gravley, C. K., 2,497,665, Piezoelectric Device; 2,497,666, Electrode for Piezoelectric Crystals

Griffith, F. S., 2,497,725, Recovery of Manganese by Electrolysis

Weisberg, L., 2,497,806, Electrodeposition of Cadmium

Molloy, E. W., 2,497,823, Radiation Measuring Device for Air Filters

February 21, 1950

Urbach, F., and Pearlman, D., Application 667,012, Luminescent Materials

Luke, C., 2,497,894, Method of Electroplating Fine Wire of Low Elastic Limit

Ostrander, C. W., 2,497,905, Coating Zinc or Cadmium to Impart Corrosion and Abrasion Resistance

Green, D. F., and Salmon, J. E., 2,497,988, Indium Plating

Young, C. A., 2,498,021, Method and Apparatus for Assembling Battery Elements

Lang, M., 2,498,128, Apparatus for Electroplating Workpieces

Lindsay, A. R., 2,498,129, Electrical Etching Device

Blackburn, W. E., 2,498,240, Selenium Rectifier

Switzer, J. L., and Switzer, R. C., 2,498,592, Daylight Fluorescent Pigment Compositions; 2,498,593, Daylight Fluorescent Resinous Sheeting Materials

February 28, 1950

Escoffery, C. A., and Hawk, W. H., 2,498,666, Rectifier Unit

Searle, A. M., 2,498,714, Selenium Rectifier

Kimball, C. N., Lewis, W. R., and Strecker, H. A., 2,499,069, Method of Testing Moisture Content of Materials

Stormon, D. B., 2,499,120, Production of Hexachlorocyclohexane

Calfee, J. D., and Florio, P. A., 2,499,129, Photochemical Manufacture of 1,1,1-Difluorochloroethane

Stareck, J. E., 2,499,231, Method of Producing Surface Conversion Coatings on Zinc

Williams, F. D., Jr., 2,499,239, Flat Type Alkaline Dry Cell

Ginther, R. J., 2,499,307, Barium Di-Silicate Phosphor

March 7, 1950

Ruben, S., 2,499,419, Alkaline Primary Cell with Permanganate Depolarizer

Tama, M., 2,499,540, Method of Treating Metals in Induction Furnaces; 2,499,541, Drum Type Induction Furnace

Calfee, J. D., and Smith, L. B., 2,499,629, Photochemical Manufacture of 1,1,1-Difluorochloroethane

Medlar, L. A., 2,499,663, Safety Device for Thermally Controlled Battery Chargers

Sabaut, E. R., 2,499,782, Furnace Electrode with Cooling Means

Yntema, L. F., and Ksycki, M. J., 2,499,807, Process for Electroplating Molybdenum and Its Alloys; 2,499,808, Process for Electroplating Molybdenum and Molybdenum Alloys

Molloy, E. W., 2,499,830, Air Proportional Counter

Dietz, V. H., 2,499,852, Apparatus for Determining the pH of Small Amounts of a Specimen

Hansen, J. R., 2,499,860, Production of Permanent Magnets and Alloys Therefor; 2,499,861, Permanent Magnets and Alloys Therefor; 2,499,862, Permanent Magnets and Alloys Therefor

Richardson, C. N., 2,500,008, Ammonia Synthesis

Magoffin, J. E., and Vance, T. E., 2,500,039, Electrolytic Method of Preparing Manganese Dioxide

NOTES FROM INDUSTRY

Products

NEW YORK LABORATORY SUPPLY COMPANY, New York, has announced the T-Channel support frame, a flexible method of supporting laboratory apparatus. This new product employs square horizontal support rods which insure rigidity when heavy apparatus is being supported. The base consists of T-Channels which permit simple installation of the vertical support rods anywhere along its entire length. The outstanding feature is that any support rod can be added or removed without dismantling any other part of the frame.

CORNING GLASS WORKS announced that it recently began shipments of a new type of industrial glass pipe, to be known to the trade as Pyrex brand Double Tough Glass Pipe. In addition to the advantages of their present glass piping, this product boasts several important new features. These include: heat strengthening of all standard fittings—except "U-bends"—and ends of all straight lengths; fifty per cent closer tolerance on length, flatness, angularity, and bow. Available at no increase in price.

GENERAL SCIENTIFIC EQUIPMENT COMPANY has announced a new, fast, self-priming drum pump for alcohols, paint thinners, light oils, and other

volatile liquids, equipped with a positive shut-off valve that is absolute protection against evaporation losses. Its maximum capacity is 15 gallons per minute. The pump, No. 750, has no pistons, rings, or leathers; no rotating parts to stick or wear. The special diaphragm is a heavy cord-fabric vulcanized between synthetics. It does not dry out, swell up, rust, or corrode. Other features are a handy fill-spout, drain back, and a locking link to prevent use of pump by unauthorized persons.

EMIL GREINER COMPANY, New York City, recently introduced the Ultramax Buret which is made of Fischer & Porter precision bore Pyrex tubing with permanently fused-in markings for absolute accuracy. A unique feature is the valve arrangement integral with the tube, which creates a positive pressure seal, eliminating leakage and freezing of plug. The Buret is simple to clean and its parts are easily replaceable.

ALLIED RESEARCH PRODUCTS, INC., Baltimore, recently announced the following new products: Iridite Alcote, a new finish for aluminum, which provides corrosion resistance, paint adherence characteristics, and abrasion resistance believed unobtainable with other chemical dip aluminum finishing processes; Iridite #8-P, a powdered Iridite, will achieve savings in shipping costs and eliminate the need for return-

CUSTOM BUILT DC SUPPLIES
AT STOCK MODEL PRICES

A statement supported by FACTS

Fact is . . . we have the most versatile list of rectifiers as stock units and in many cases a rectifier to meet some most exacting requirements can be supplied from our warehouse.

Fact is . . . the Electrochemical department of Columbia University invited our assistance in solving their rectifier problems. This was done to complete satisfaction without exceeding their budget requirements.

Let us present you with the FACTS

To solve your RECTIFIER problems

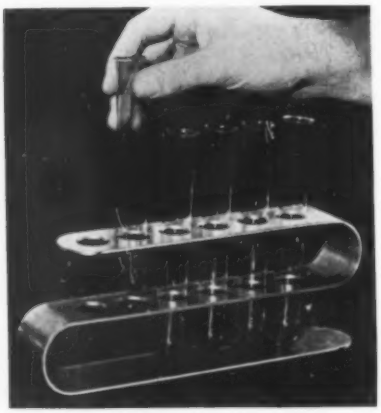
Write for free illustrated booklet

Illustrated is the Model #103 now in use in the Electrochemical dept. of Columbia University, capable of supplying filtered pure 10 amperes of DC power at a continuously variable voltage from 0 to 30.

RAPID ELECTRIC CO., DEPT. EC
2847 Middletown Road Bronx 61, N. Y.

able packaging; ARP #3, a new zinc plate brightener, supplied in liquid form, is claimed to produce better results at lower cost than other products now available.

FISHER SCIENTIFIC COMPANY, Pittsburgh, has designed a streamlined but extremely functional rack called the S-Shape Aluminum Test Tube Rack.



Made of heavy anodized aluminum sheeting, it will not crack, break, split, sag, swell, or pull apart even when subjected to unusual conditions of temperature, moisture, or corrosion.

THE HANSON-VAN WINKLE-MUNNING COMPANY, Matawan, New Jersey, has announced a new improved plating barrel clamp of Merlon construction called Type "C". The advantages of

the new clamp are that it is constructed of two parts only, it is simple to operate because of an adjustable screw, it has no metal parts, and is cheaper than the old type. Available for all 14-inch cylinders, cut to order for other sizes.

Personalities

RCA VICTOR DIVISION of the Radio Corporation of America has announced the appointments of R. C. Dove and H. V. Somerville to the positions of Operating Assistant to the Vice-President and Technical Assistant to the Vice-President, respectively.

WALLACE K. BELIN of Grosse Ile, Michigan, has been appointed production superintendent of Monsanto Chemical Company's Trenton, Michigan, plant. Mr. Belin succeeds Herbert O. Tittel of Trenton, who has become manager of the company's plant at Anniston, Alabama.

EMPLOYMENT SITUATIONS

Please address replies to box shown, c/o The Electrochemical Society Inc., 235 West 102nd Street, New York 25, N. Y.

Positions Wanted

TECHNICAL SERVICE, RESEARCH, OR DEVELOPMENT: B.S. in Ch.E., 1939. Electrochemical experience: quality control, research, development, production, administration. 2½ years industrial electroplating. Dry batteries, 4 years Signal Corps Dev. Labs., 3½ years industrial. Practical mechanic. Desires interesting permanent position with responsibility and advancement. *Reply to Box 337.*

ELECTROCHEMIST: Ph.D. 12 years' broad experience covering research, development, technical supervision in electrodeposition of metals and alloys, electroplating, batteries, theoretical electrochemistry, metal protection, and corrosion. Papers and awards. Can initiate and carry out research program. Desires academic or permanent responsible position. Location immaterial. Available immediately. *Reply to Box 338.*

DRY BATTERY PLANT SUPERINTENDENT, graduate chemical engineer, over 25 years, experience in all aspects of dry battery operations. Until recently associated with one of the largest organizations in the country as plant superintendent. Holds several patents for dry battery products; co-patentee of nationally known dry battery specialty. No preference as to location. *Reply to Box 339.*

METALLURGIST, B.S. (Chem.), postgraduate work in metallurgy. Research and process development experience in the application of leaching, furnace, and electrolytic methods to the recovery of and refining of copper, lead, tin, silver, cadmium, and other nonferrous metals. Experience, metal powders. *Reply to Box 340.*

Chlor-Alkali Report

(*Continued from page 122C*)

cuprous chloride, which latter in turn is oxidized with oxygen or air in the presence of HCl and returned to the cells.

The shipment of hydrochloric acid in large river barges has been announced during the past year (Dow). Each of five barges carries four rubber-lined tanks, each tank with a capacity of 58,400 gallons.

Miscellaneous Developments

The Chlorine Institute celebrated its 25th anniversary in January 1949. It has for many years studied and promoted the use of chlorine in sanitation, particularly in public water sanitation. Harry A. Faber of the Institute has for the past two consecutive years been officially recognized for his work in the field of water technology.

The use of chlorine dioxide in the field of flour bleaching, water sanitation, and for final bleaching of pulp is at present the subject of considerable active interest in the United States, Canada, and abroad.

W. Herschkind, in an interesting paper,[4] describes briefly Dow's process for direct chlorination of methane and discusses some of the preliminary work, using either photochemical or thermal chlorination. The production of hexachloroethane from carbon tetrachloride via perchloroethylene is also touched upon.

The original paper on "Thermodynamic Properties of Chlorine" by R. E. Hulme and A. B. Tillman[5] was followed by another paper by R. E. Hulme[6] entitled "Thermodynamic Properties of Superheated Chlorine" and giving in table form complete data on specific gas volume, enthalpy, and entropy between 10 and 400 pounds pressure and 0° and 400°F. A further discussion of the subject is found in the March 1950 issue of the same publication (pp. 194–195).

A paper by R. E. Hulme on "Heat Content of Anhydrous NaOH" appears in the February 1950 issue of *Chemical Engineering* (139–141).

During the past year, Great Lakes Carbon Corporation was added to the list of manufacturers of graphite suitable for chlorine-alkali cells.

[4] *Ind. Eng. Chem.*, pp. 2749–2752 (December 1949).

[5] *Chem. Eng.*, pp. 99–103 (January 1949).

[6] *Chem. Eng.*, pp. 118–119 (November 1949).